

Michigan VII Update

Designing a better transportation system through Vehicle Infrastructure Integration

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Welcome to VII in Michigan

by Kirk T. Steudle, P.E., MDOT Director

Welcome to the premier issue of *Michigan VII Update*. Our goal is to keep you informed of new developments in VII projects in Michigan and of other ITS related events.

Vehicle infrastructure integration VII is an approach within the field of intelligent transportation systems to improve driver safety and reduce delays on busy highways. Soon it will be possible for data to be transmitted between vehicles, and from the roadside to the vehicle. This data could take the form of messages that warn drivers that it is not safe to enter an intersection or that suggest alternate routes to avoid traffic tie ups. With VII, vehicles will serve as data collectors and transmit traffic and road condition information from every major road within a transportation network, and automobile manufacturers could more quickly notify drivers of warranty recall needs.



MDOT PHOTOGRAPHY

VII Mission:

MDOT's VII mission is to partner with public agencies, the automotive industry, and the telecommunications industry to lead the nation in VII research and sustained VII deployment by providing the public foundation for Michigan's new automotive information technology industry and ensuring improvements in transportation systems safety and operational performance.

The Michigan Department of Transportation MDOT has partnered with automotive manufacturers and suppliers, universities, the telecommunications industry, and several transportation organizations to form the VII initiative, a program to evaluate the feasibility of VII and its potential impact on how MDOT does business. This partnership represents the planning, research, development, and deployment leadership that will be the key to VII's success in Michigan.

VII is no doubt the biggest advance in passenger and commercial transportation since the inception of the interstate highway system. Test results provide clear, measurable evidence that VII increases transportation safety, mobility, and security. We hope you enjoy this premiere issue of *Michigan VII Update* and invite your comments.

Evaluation of The Economic Impacts of VII in Michigan

MDOT is actively pursuing strategic initiatives in alignment with VII in Michigan's mission to partner with public agencies, the automotive industry, and the telecommunications industry to lead the nation in VII research and sustained VII deployment. A multiphased VII test bed program and study of the operational, partnership, and economic impacts and internal issues

are evidence of MDOT's strong commitment and leadership roles at the regional and national levels.

A topic of paramount importance is determining the economic benefits and impacts of the proposed action, which would be useful for decision makers at administrative and legislative levels.

If, after the test bed phase of VII, the full deployment of the new technology is undertaken with obvious commitment of funds and resources, then the following questions need to be addressed: What will be the resulting impact on the region's job market or employment? On the state's tax base? On the state's total compensation or income?

Michigan State University, under contract with MDOT, has organized a team of engineers and economists to determine and evaluate the economic impacts of VII in Michigan.

At completion of this six month, fast track study, the report will include direct and intermediate employment count, state taxes generated, and total compensation for both direct and intermediate employment including personal income and aggregate total of mandated state benefits including workers compensation.

For more information contact Kunwar Rajendra, MSU, Adjunct Professor, Department of Electrical and Computer Engineering, 517 353 9562, rajendr2@egr.msu.edu.

MDOT VII

Strategic and Business Plan

Currently, 42,000 people die annually on our roadways. Traffic accidents are the leading cause of death for people between the ages of 4 and 33. Fifty percent of the deaths occur from intersection collisions and vehicles leaving the roadway.

Still, in the near future, the operation of our roadways will require more than proper timing of signalized intersections and keeping roadways free of debris and obstructions. Traffic congestion continues to increase and gridlock occurs in major cities around the world.

Operating a better traffic transportation system will require the use of wireless technology that allows vehicles to communicate with one another and with the roadways on which they are driven. Wireless technology will help increase the efficiency of traffic management making our roadways safer to travel, while decreasing congestion and the potential for traffic related incidents.

MDOT is actively involved in VII initiatives that will influence the safety of passengers in vehicles and how drivers make decisions based on information received from other vehicles and the roadway. The intent is to establish wireless connectivity among vehicles and to the roadside infrastructure to help save lives, time, and money and to spur economic development. MDOT and its partners have developed a five year VII strategy to ensure this infrastructure is built in Michigan. The strategy focuses on partnering, developing, and deploying such a VII infrastructure and test beds; increasing safety and mobility; improving asset management; developing outreach programs to better expose others to VII in Michigan; justifying the need for VII; and determining creative funding venues for VII.

Strategic Goals

- Partner with essential stakeholders to deliver a national VII
- Lead the nation in creating an effective infostructure
- Build and promote test-bed facilities
- Support safety research related to VII
- Support research and R & D in VII traffic-management systems
- Support research and R & D in VII asset-management systems
- Maintain high visibility through outreach and public awareness
- Justify deployment and provide evidence of value-added results
- Coordinate and leverage Michigan investment to attract national and international support

MDOT VII Strategic and Business Plan captures the vision, mission, needs, goals, activities, and measures of success that will guide a coordinated, efficient, safe, and integrated vehicle infrastructure system throughout the state. The plan will initiate a course of action toward establishing the required public and private sector partnerships that will ensure leadership, innovation, and progress across Michigan. The plan includes partnering with key organizations and providing leadership, statewide and nationally, to research, develop, and deploy VII.

The strategic plan was formulated to align with MDOT's organizational mission "to provide the highest quality integrated transportation services for economic benefit and improved quality of life," which address the needs of MDOT customers and partners through improved safety, traffic management, and asset management. The VII strategy describes MDOT activities that address a broad set of customer and partner needs, such as providing leadership in VII research and development, providing state of the art VII test facilities, and growing a sustainable VII deployment. The plan also describes the economic needs that will be met by pursuing financial support to provide a cost effective integrated transportation

system that will have positive economic benefits for Michigan.

The strategic business plan will be presented to different audiences that will need to see the plan in 2007. Feedback from these groups will then be incorporated into the plan. These presentations will include ITS Michigan, the Management Briefing Seminars in Traverse City, as well as other targeted workshops. David Cole, Steve Underwood, and Pat Flaherty of the Center for Automotive Research CAR are important resources in this outreach activity.

To learn more about VII activities in Michigan, go to www.michigan.gov/mdotvii.

Partners

Transportation Agencies:

- Michigan Department of Transportation
- Federal Highway Administration
- Road Commission for Oakland County
- Road Commission of Macomb County
- California Department of Transportation
- Florida Department of Transportation
- Minnesota Department of Transportation
- Ontario Ministry of Transportation
- Transport Wales (UK)
- Sweden (Vinnova & Transportation)

Original Equipment Manufacturers OEMs :

- General Motors
- DaimlerChrysler Corporation
- Ford Motor Company
- Nissan Motors North America

Communications Carriers:

- Motorola
- Azulstar Networks Research

Institutions:

- University of Michigan Transportation Research Institute
- Michigan State University

Other State of Michigan Agencies:

- Michigan State Police
- Michigan Economic Development Corporation
- Michigan Department of Information Technology

For more information contact Steven J. Cook, P.E., MDOT, Operations Engineer for VII, 517 322 5709, cooksj@michigan.gov.

MDOT Partners with Nissan and UMTRI to Make Intersections Safer

MDOT is working with Nissan Technical Center North America and the University of Michigan Transportation Research Institute UMTRI to create a VII test bed to make intersections safer. The project includes creating a simulated lighted intersection exchange in Lansing at the corner of Ricks Rd. and Harris Dr. at the State Secondary Complex. The testing will assist in understanding the effectiveness of technology installed in vehicles that alerts drivers of changes in signal timing.

Nissan will provide three to five specially equipped vehicles for testing, and UMTRI will select the test drivers and assist in the field operational test. "Real time testing brings us one step closer to realizing our goals for vehicle and infrastructure integration," says MDOT Director Kirk T. Steudle. "Transportation is going to be transformed by VII in the very near future."

This testing activity demonstrates how the private and public sectors can work together with a common goal of safer roads in Michigan. The goal aligns with MDOT VII Strategic and Business Plan and Governor Granholm's initiative to create public and private partnerships to stimulate growth in Michigan's economy, while also increasing safety and mobility.

For more information contact Ron Heft, Nissan, Senior Principal Engineer, 248 207 4817, heftr@ntcna.nissanusa.com.

VII in Michigan Test Bed Program

The VII Michigan test bed program will provide a real world laboratory to test a range of products and technologies and foster the development of new technologies. Testing phases include evaluating subsystems and applications and proving the VII concept in a real world testing environment. The longer term vision is to evaluate full use cases for VII that require advanced technologies or a higher level of saturation of VII enabled vehicles in the vehicle fleet.



A test-bed installation at Telegraph and 12 Mile Roads in Oakland County.

MDOT and its partners will evaluate the technical feasibility of utilizing existing infrastructure and technologies to transfer data from a roadside device to a central processing location that will also buffer and store data. Intelligent vehicles will also be evaluated as means of collecting, receiving, and communicating data to the infrastructure.

For more information on the test bed program contact Gregory D. Krueger, P.E., MDOT, Statewide ITS Program Manager, 517 373 9479, kruegerg@michigan.gov.

For more information on the DUAP project see next article contact Gregory D. Krueger or Steven J. Cook, P.E., MDOT, Operations Engineer for VII, 517 322 5709, cooksj@michigan.gov.

VII Data Use Analysis and Processing

Mixon/Hill, Inc. is working with MDOT to evaluate the uses and benefits of VII related data. The Data Use Analysis and Processing DUAP project complements the activities of the Vehicle Infrastructure Integration Consortium VII C and related industry activities. *See next article on page 4, for more on VII C.*

VII in Michigan will yield significant quantities of additional data collected from roadways. Mixon/Hill will determine the impact that such an increase in data will have on how state and local departments of transportation conduct business.

Mixon/Hill will develop prototype applications and data management software that will use preliminary data acquired through the Michigan VII test bed program, identify uses for the data, develop algorithms to use and process the data, and evaluate how well the data and algorithms function in a department of transportation.

The first phase of the project will focus on real time applications of sensed data such as traffic information, performance measure calculations, congestion mitigation, and air quality applications. The second phase will cover intermediate and historic time frames such as archival information, cumulative performance measures and trends, and asset management.

UMTRI is playing a key role in DUAP and VII by performing an independent evaluation of VII applications and databases. This effort will identify and maximize the effectiveness of VII applications and assess their potential impact on MDOT business processes and on safety, efficiency, and environmental outcomes. This evaluation and documentation will also assist in positioning Michigan as the lead state in the national VII process.

U.S. DOT Projects in Michigan

There are three major U.S. DOT projects related to VII, all of which are being conducted in Michigan:

- **CAMP/CICAS:** MDOT is participating in the Cooperative Intersection Collision Avoidance System CICAS, a \$30 million program to design, test, and develop systems to prevent crashes at intersections using new wireless communications technologies. Much proof of concept testing will occur in Michigan, particularly for CICAS V, a primarily vehicle based system that warns drivers of any impending stop sign or red light violations. Technical development is led by the Crash Avoidance Metrics Partnership CAMP.

- **VII-C:** The Vehicle Infrastructure Integration Consortium is a Michigan nonprofit corporation founded in 2005 by a group of light duty vehicle manufacturers to design, test, and evaluate a deployable VII system for the United States. VII C has been funded at \$53 million to establish cooperative agreements for evaluating deployment viability, promote public and private consensus, establish a venue for dialogue, promote common business interests, and promote and encourage productive relationships.

- **IVBSS:** The University of Michigan Transportation Research Institute UMTRI has been awarded \$25 million to develop Integrated Vehicle Based Safety Systems IVBSS. These systems warn drivers when they may be about to leave the road way, are in danger of colliding with another vehicle while attempting a lane change, or are at risk of colliding with the vehicle in front of them.

See future editions of this newsletter for more information on each initiative.

SEMSIM Improves Winter Road Maintenance

The Southeastern Michigan Snow and Ice Management System SEMSIM is the first project nationwide that joins multiple government agencies to implement ITS technologies to improve regional winter road maintenance. SEMSIM pairs the four largest road agencies in southeast Michigan and the regional public transit provider, SMART, led by the Road Commission for Oakland County RCOC. These agencies are responsible for maintaining most major roads in the metropolitan Detroit area.

The project has created a communications and data collection infrastructure that provides supervisors with information on where trucks are and whether they are salted, plowing, or deadheading and also provides air and pavement temperatures, all in real time. Ultimately this information could be provided to motorists. Technologies include automated vehicle location AVL, geographic positioning systems GPS, and SMART's radio communications.

For more information contact Dennis G Kolar, RCOC, Deputy Managing Director and County Highway Engineer, 248 645 2000, dkolar@rcoc.org.

VII and the Society of Automotive Engineers

The Society of Automotive Engineers SAE International Dedicated Short Range Communication

DSRC Technical Committee has approved a set of messages that are available today as "J2735 Dedicated Short Range Communication DSRC Message Set and Data Dictionary Recommended Practice."

Currently, five message sets, which enable vehicle to vehicle and vehicle to roadside communication, are defined: basic safety, common safety request, emergency vehicle

Upcoming Events

ITS Michigan Annual Meeting,
May 16–17, Rock Financial Showplace,
Novi, Michigan, www.itsmichigan.org

National Rural ITS Conference,
October 7–10, Grand Traverse Resort
and Conference Center, Traverse City,
Michigan, www.michigan.gov/mdot/

alert, generic transfer, and probe vehicle data. Each message set will provide important information to vehicle drivers and traffic engineers. Drivers can make decisions regarding the safety and mobility of their trips, and traffic engineers can assess travel, road, and weather conditions in near real time. Other message sets are in the early development phase and will be implemented as VII safety and mobility systems advance and user needs become more defined.

Privacy must be maintained as data is transferred back and forth between the vehicle and the road side. However, it is possible to develop a design that balances the data needs of traffic engineers and the privacy needs of motorists.

The SAE DSRC Technical Committee is asking field practitioners to use the messages and provide feedback to SAE. The J2735 recommended practice is available at www.sae.org or by calling SAE International at 877 606 7323.

Comments may be directed to Caroline Michaels, SAE, Staff Engineer, 248 273 2490, carolinemichaels@sae.org.

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Gregory D. Krueger, P.E.
Statewide ITS Program Manager
517-373-9479 • kruegerg@michigan.gov

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For permission to reprint text or graphics, or if you have suggestions or comments, contact Monica Milla, UMTRI editor, at 734-936-1052.

For all other matters, the UMTRI point of contact is Todd Anuskiewicz, 734-763-4668, toddan@umich.edu.